ArgoNeuT Update

All Experimenter's Meeting

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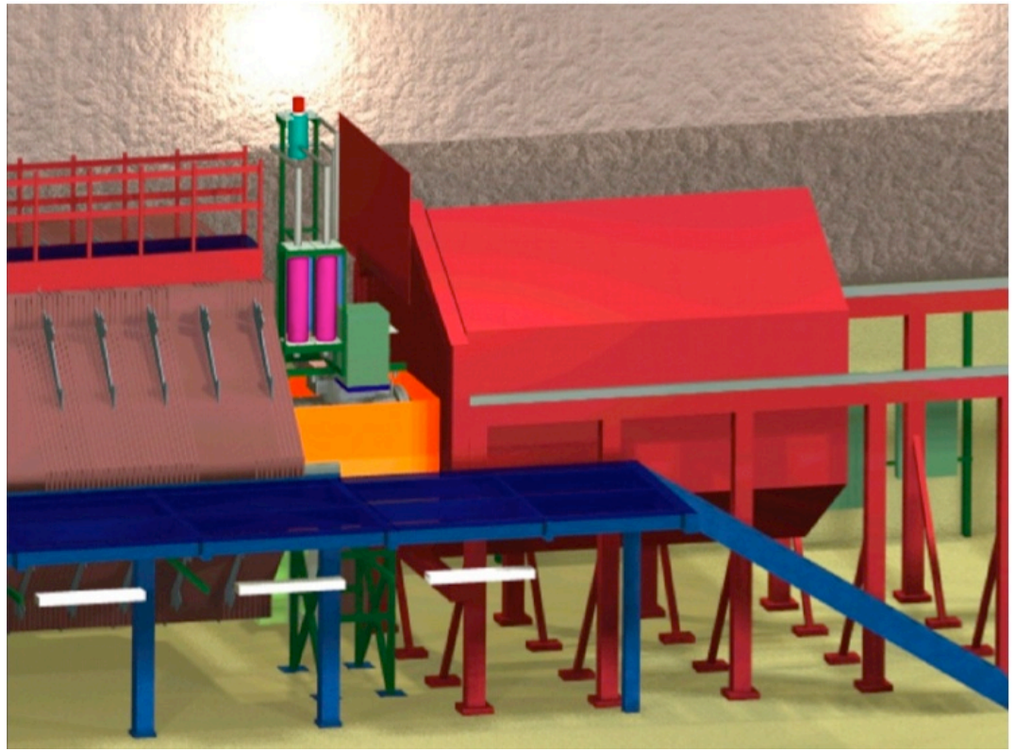
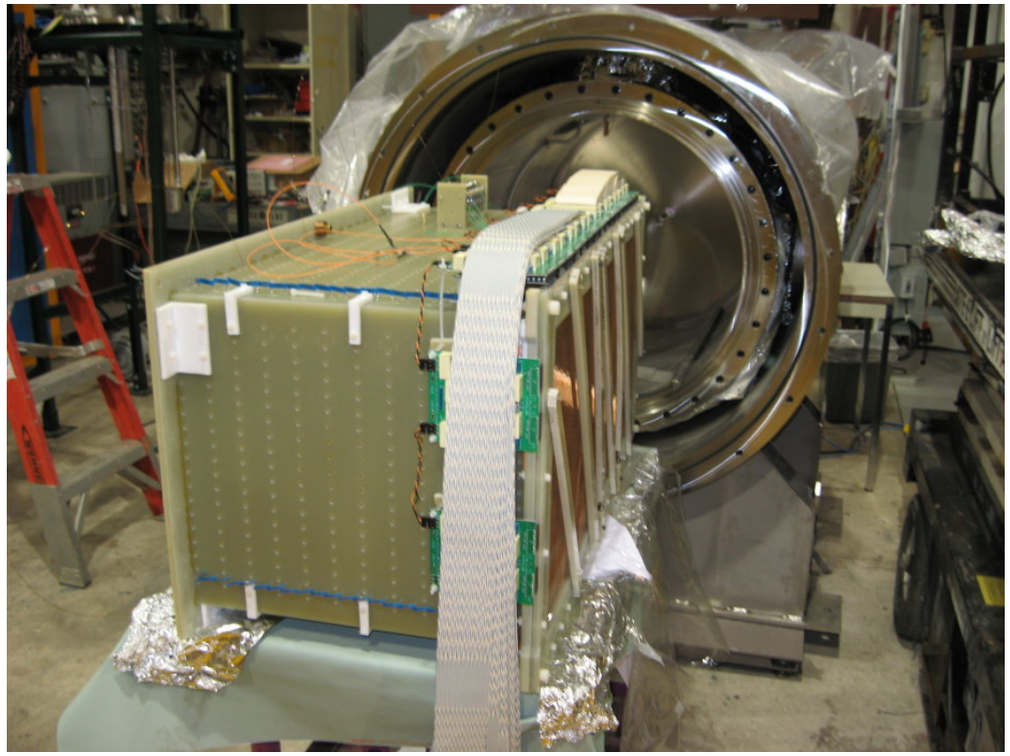
Introduction

- ArgoNeuT (a.k.a. - test-beam project T962) is a 175 liter Liquid Argon Time Projection Chamber
- Sits in front of MINOS near detector in NuMI beamline. Use MINOS as a muon range stack.
- Goals:
  - Gain experience building/running LArTPCs.
  - Accumulate a sample of (anti)neutrino events.
  - Confront some aspects of underground running.
  - Develop simulation of LArTPCs and compare with data.



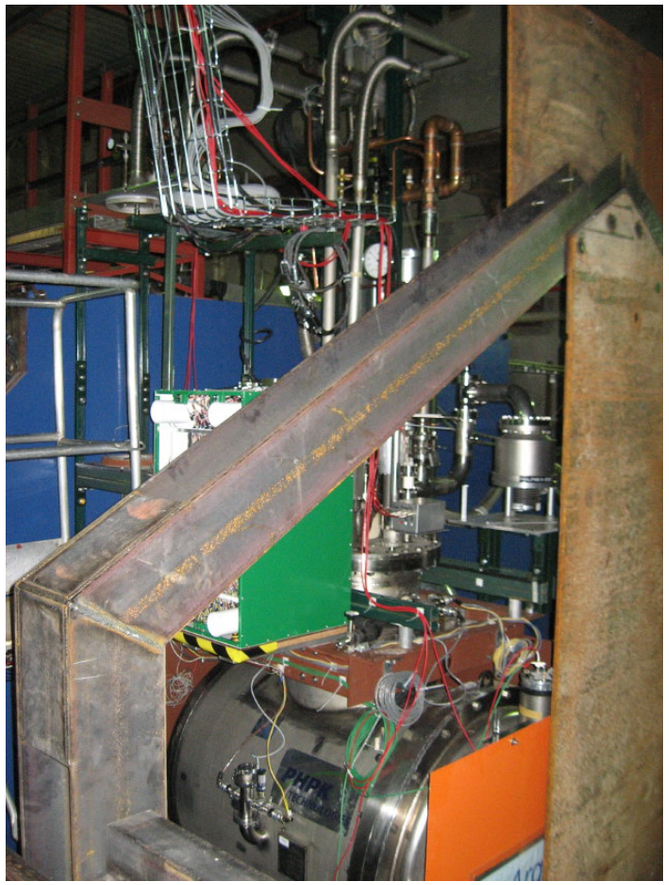
Schematic of NuMI experiments

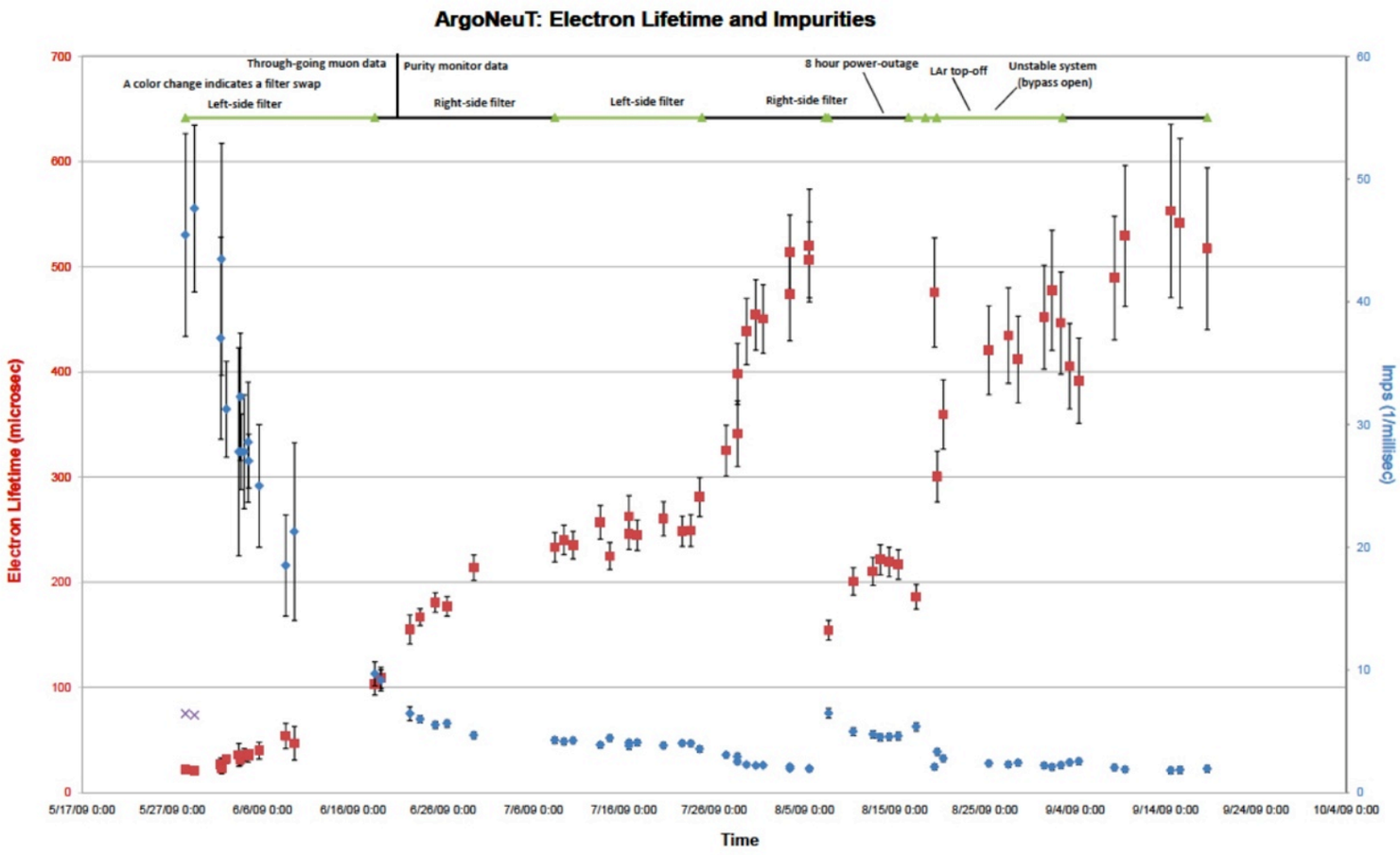


TPC About to Enter Cryostat

Status

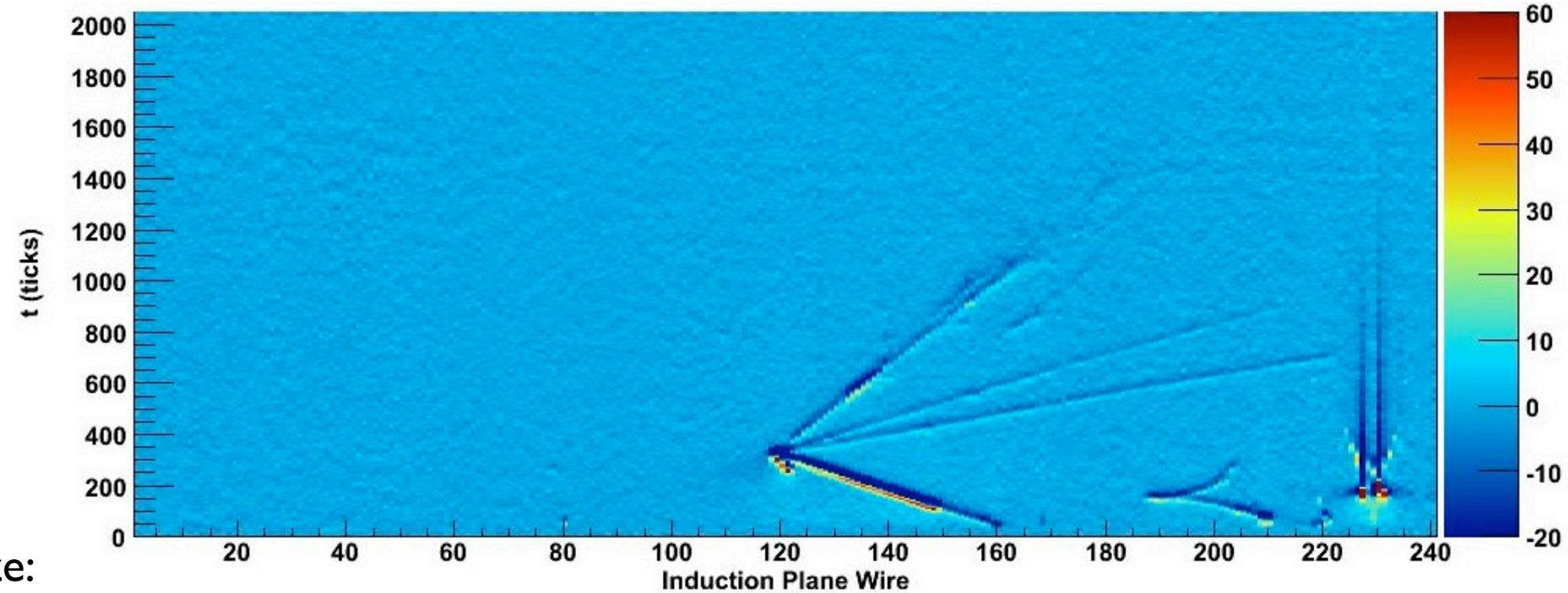
- System was initially filled on May 8, 2009. Took data for several weeks before shutdown.
- System has been running since initial fill (kept recirculating through summer).
- Electron lifetimes >500μs have been achieved…more than adequate for our detector.
- Have been running since end of shutdown…initially in neutrino mode, now in antineutrino mode.

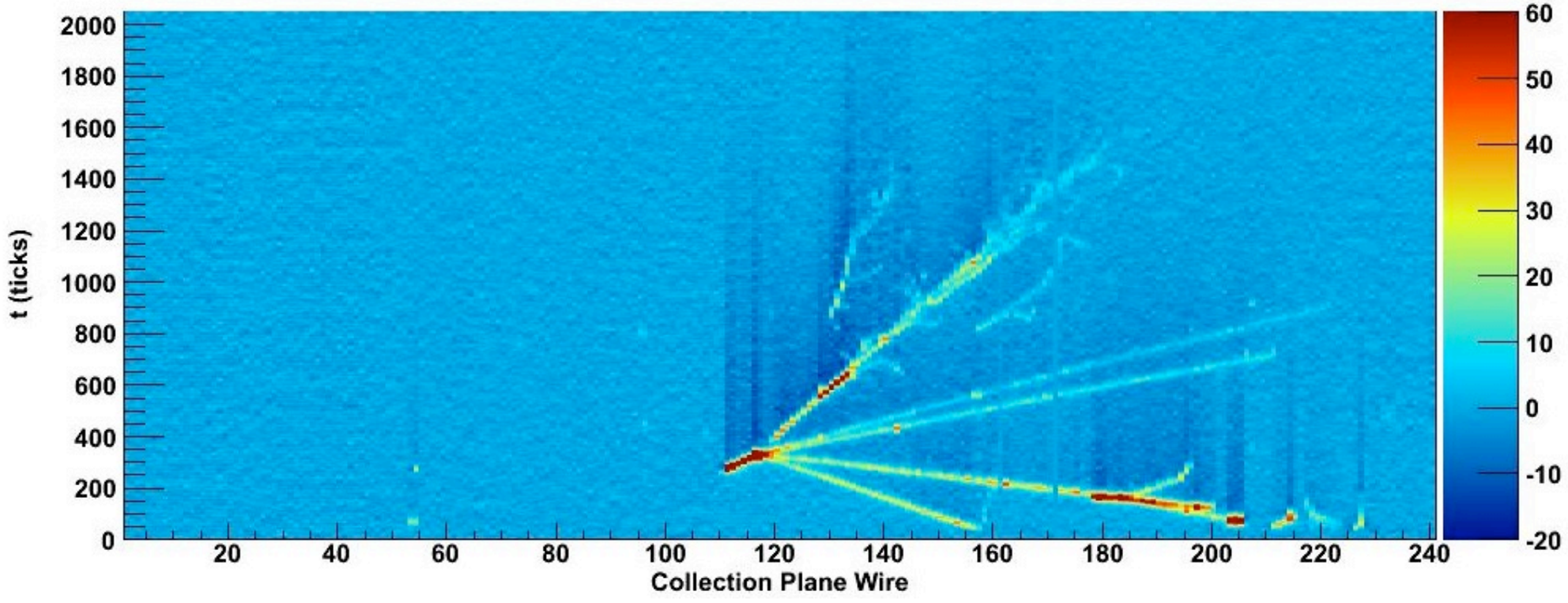




Neutrino Candidate

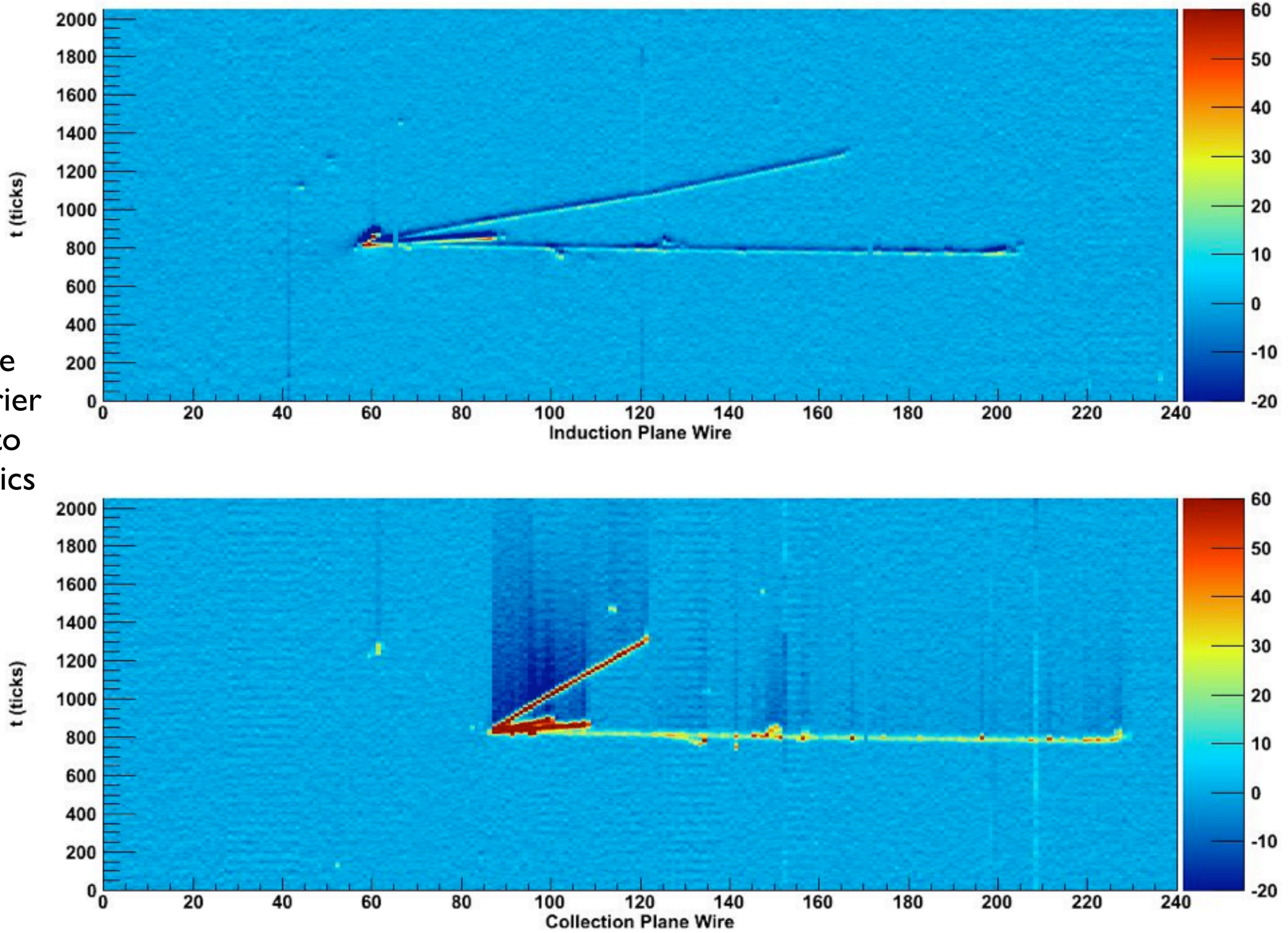
Pixel size:
4mm x 0.3mm



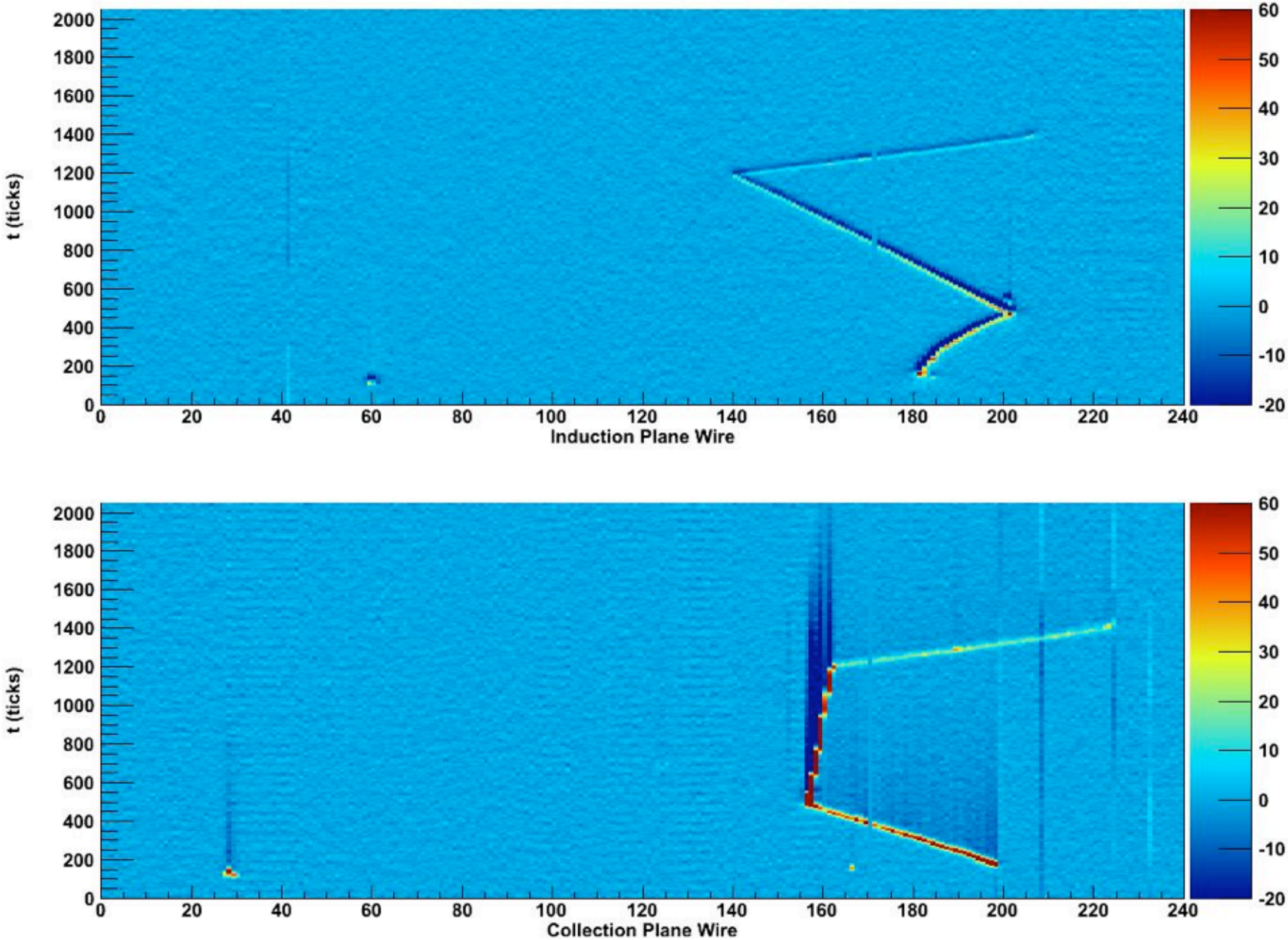


Neutrino Candidate

Raw data can be put through Fourier deconvolution to remove electronics response.



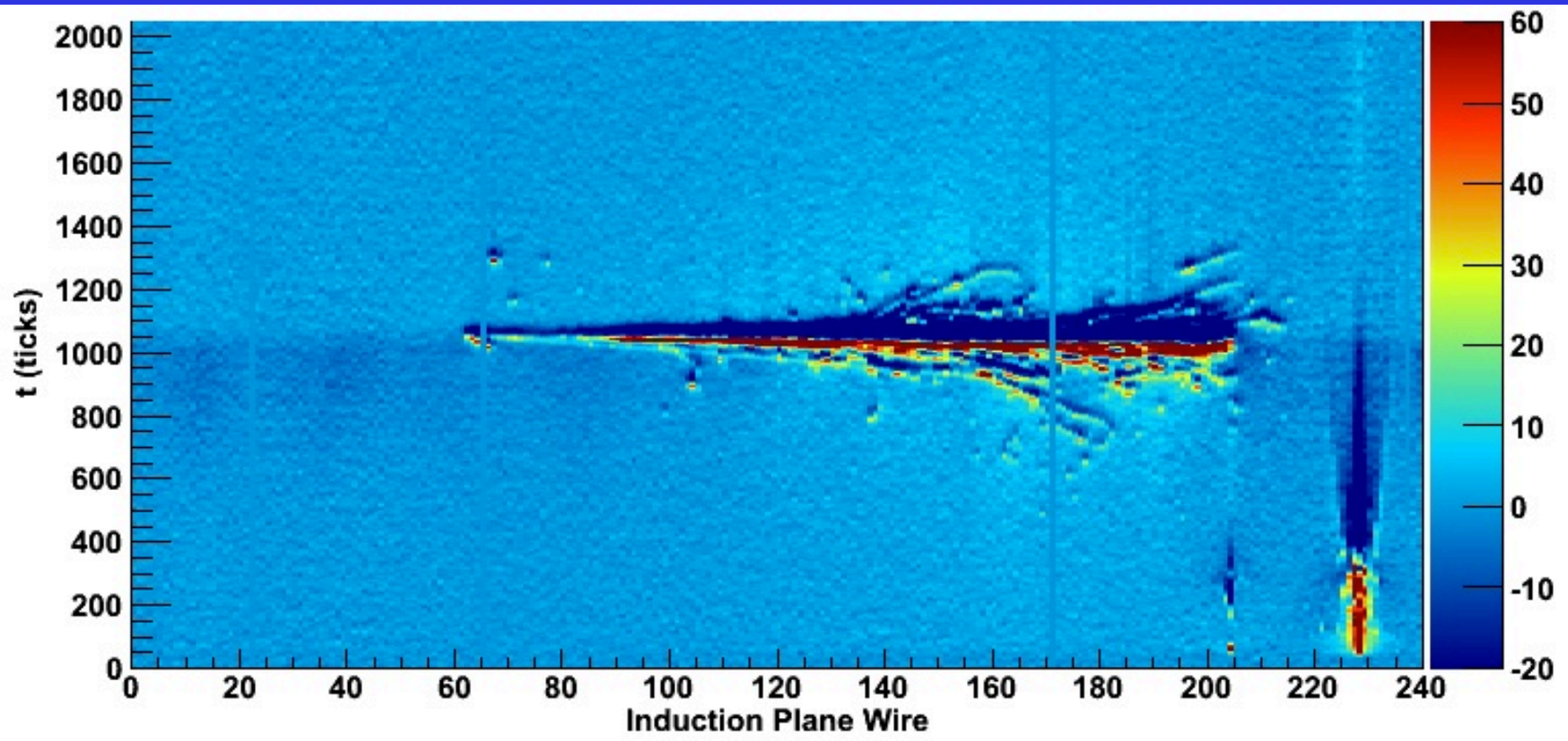
Neutrino Candidate

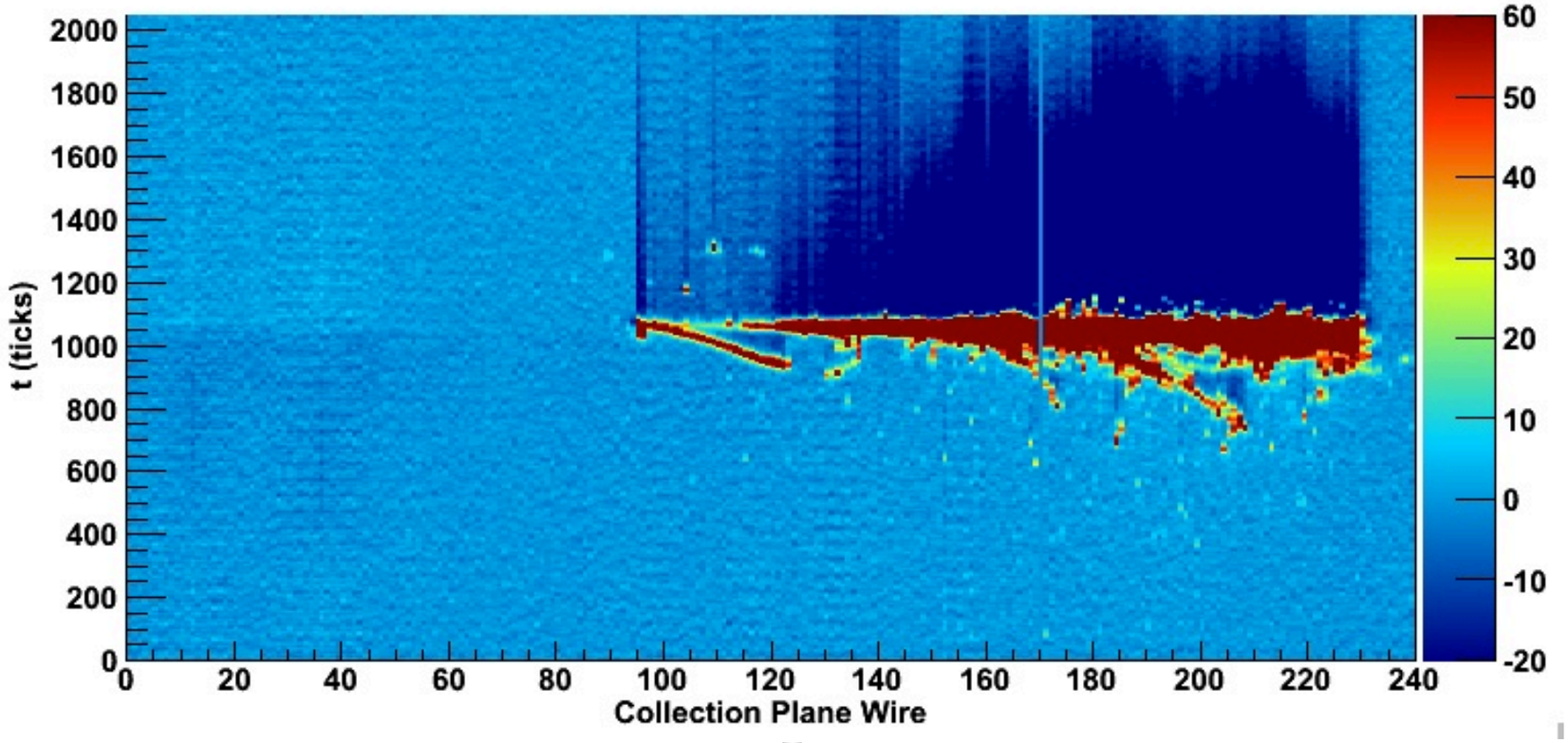


Neutrino Candidate

CCQE ν_e candidate (Sept. 2009)

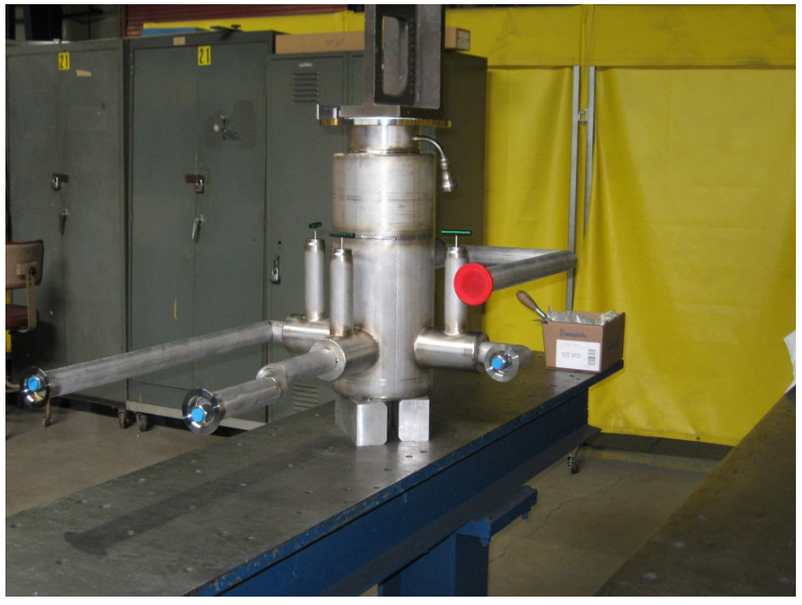
ν_e CC Event





Cryo. Issues

- We developed a problem with our cryogenic system the evening of Oct. 4, 2009.
- Cryo. issues indicate a sudden drop in cooling power of our cryocooler.
- Lack of cooling power prohibits us from utilizing our filters.
- Our cryocooler is not near it's normal maintenance period, and these are known to be very reliable.
- Suspect that either:
  - Heat-exchanger block bolted to the cold-head is no longer making proper contact.
  - Some internal mechanism of cryocooler is causing problems…manufacturer suggests there are potentially simple fixes.
- Need to remove the cryocooler assembly from the system in order to work on it.
- Have a backup cryocooler from DECAM if necessary (arrangements to replace theirs immediately would be made).



Plan

- We removed the cryocooler assembly this morning….repairs will begin immediately.
- Have already begun to warm up the rest of the cryogenic system, since Argon purity diminishes when we are not recirculating through filters….a refill will be necessary.
- Expect repair/testing of cryocooler to take several days, during which we will be readying the system for a refill (warming up completely, reinstalling vacuum systems, pumping down).
- Can refill as soon as cryocooler assembly is reinstalled and system is pumped down.
- Working on plan to refill as quickly as possible.